IN THE CLAIMS:

Claims 70-73, 77, 79-83, 85, 86, 88, and 90 are amended herein. All pending claims and their present status are produced below.

45. (Previously presented) The method of claim 91, wherein the first image data signal is stored in a first portion of a memory unit and the second image data signal is stored in a second portion of the memory unit.

46. (Previously presented) The method of claim 91, wherein the first image data signal is stored in a first portion of a memory unit at a start of operation of the optical detection system and the second image data signal is stored in a second portion of a memory unit for each set of measurements of the similarity of images.

48. (Previously presented) The method of claim 91, wherein the second image data signal is substantially a shifted version of the first image data signal.

49. (Previously presented) The method of claim 91, wherein the first image data signal comprises a first speckle image data signal and the second image data signal comprises a second speckle image data signal.

53. (Previously presented) The method of claim 91, wherein the similarity of at least two image data signals is based on each image data comprising a set and is measured at a multiple of a shift value, each set comprising a high resolution and a low resolution image data signal, and the image data signal in a first set being shifted by a predetermined shift value prior to the measurement.

54. (Previously presented) The method of claim 91, wherein measuring the similarity is performed through an application of a cross correlation function.

55. (Previously presented) The method of claim 91, wherein the displacement value comprises identifying a shift to apply to the first image data signal that results in a substantial similarity between the first image shifted by the displacement value and the second image.

56. (Previously presented) The method of claim 91, wherein the first image data signal is replaced by the second image data when a displacement value comprises a predetermined value.

57. (Previously presented) The method of claim 91, wherein the at least one optical element comprises a lens.

58. (Previously presented) The method of claim 91, wherein the at least one optical element comprises a lens and an aperture.

59. (Previously presented) The method of claim 91, wherein the coherent light beam from the coherent light source comprises a collimated beam.

60. (Previously presented) The method of claim 59, wherein the collimated beam produces the illumination spot on the surface.

61. (Previously presented) The method of claim 91, wherein the light source comprises a laser diode.

62. (Previously presented) The method of claim 91, wherein the back-scattered light from the surface, passes through the at least one optical element to generate an image of the illumination spot on the pixels of the at least one photosensor array.

63. (Previously presented) The method of claim 62, wherein the image is focused on the photosensor array.

64. (Previously presented) The method of claim 91, wherein the back-scattered light from the surface, passes through the at least one optical element to generate an image of the illumination spot that is less than or equal to a size of the photosensor array.

65. (Previously presented) The method of claim 49, wherein the speckle image associated with at least one of the first speckle image data signal and the second speckle image data signal comprises speckles of a dimension greater than or equal to a pixel dimension.

66. (Previously presented) The method of claim 54, wherein performing the cross correlation function further comprises:
multiplying the first image data signal and the second image data signal and summing results of each multiplication operation over each data point.

67. (Previously presented) The method of claim 66, wherein the cross correlation of the first image data signal to the second image data signal is measured at a multiplicity of a shift value, the first image data signal being shifted by a predetermined shift value before the cross correlation is measured.

68. (Previously presented) The method of claim 67, wherein the displacement value comprises identifying the shift to apply to the first image data signal that results in a substantial cross correlation between the first image shifted by the displacement value and the second image.

70. (Currently amended) The system of claim ~~163~~ 164, wherein the first storage area comprises a first portion of a memory unit and the second storage area comprises a second portion of the memory unit.

71. (Currently amended) The system of claim ~~163~~ 164, wherein the first image data signal comprises a first substantially random image data signal and the second image data signal comprises a second substantially random image data signal.

72. (Currently amended) The ~~method~~ system of claim ~~163~~ 164, wherein the second image data signal is substantially a shifted version of the first image data signal.

73. (Currently amended) The system of claim ~~163~~ 164, wherein the first image data signal comprises a first speckle image data signal and the second image data signal comprises a second speckle image data signal.

74. (Previously presented) The system of claim 71, wherein the comparison module comprises a cross correlation module.

75. (Previously presented) The system of claim 74, wherein the similarity of one set to a plurality of at least two image data signals is measured at a multiple of a shift value, each set comprising a high resolution and a low resolution image data signal, and the

image data signal in the first set being shifted by a predetermined shift value prior to the measurement.

76. (Previously presented) The system of claim 74, wherein cross-correlation module applies the cross-correlation function on two sets of two image data signals, each set comprising a high resolution and a low resolution image data signals, and in each set, each of the image data signals being shifted at least a portion of a pixel on a photosensor array.

77. (Currently amended) The system of claim ~~163~~ 164, wherein the first image data signal comprises a first randomly patterned image data signal and the second image data signal comprises a second randomly patterned image data signal.

79. (Currently amended) The system of claim ~~163~~ 164, wherein the displacement value comprises an argument of the cross-correlation function at function peaks.

80. (Currently amended) The system of claim ~~163~~ 164, wherein the first image data signal is replaced by the second image data when the displacement value comprises a predetermined value.

81. (Currently amended) The system of claim ~~163~~ 164, wherein the at least one optical element comprises a lens.

82. (Currently amended) The system of claim ~~163~~ 164, wherein the at least one optical element comprises a lens and an aperture.

83. (Currently amended) The system of claim ~~163~~ 164, wherein the coherent light beam from the coherent light source comprises a collimated beam.

84. (Previously presented) The system of claim 83, wherein the collimated beam produces the illumination spot on the surface.

85. (Currently amended) The system of claim ~~163~~ 164, wherein the coherent light source comprises a laser diode.

86. (Currently amended) The system of claim ~~163~~ 164, wherein the back-scattered light from the surface, passes through the at least one optical element to generate an image of the illumination spot that is less than or equal to a size of the photosensor array.

87. (Previously presented) The system of claim 73, wherein the speckle image associated with at least one of the first speckle image data signal and the second speckle image data signal comprises speckles of a dimension greater than or equal to a dimension of a pixel of the pixels.

88. (Currently amended) The system of claims ~~163~~ 164, wherein the photosensor array comprises a plurality of photodiode pixels.

89. (Previously presented) The system of claim 74, wherein the cross-correlation module is further configured to:
multiply the first image data signal and the second image data signal; and
sum results of each multiplication operation.

90. (Currently amended) The system of claim ~~163~~ 164, wherein an image data point comprises a digital value representative of a pixel on the photosensor array.

91. (Previously presented) In an optical detection system housing a coherent light source for illuminating a surface, and an optical sensing assembly comprising at least one

photosensitive array and at least one optical element, a method for detecting movement comprising:

generating an illumination spot on the surface by lighting the surface with a coherent light beam from the coherent light source, the illumination spot providing optically back-scattered light off the surface;

arranging each optical element to pass an image of the illumination spot onto each photosensor array associated with an optical element, the photosensor array having a plurality of pixels; and

generating at least one image data signal from each photosensor array in response to the image on the plurality of pixels of that photosensor array, each image data signal comprising at least one image data point;

storing a first image data signal and a second image data signal, the first image data signal comprises a first substantially random image data signal and the second image data signal comprises a second substantially random image data signal; and

measuring similarility of images through the first image data signal and the second image data signal to obtain a displacement value, the displacement value indicative of detected movement, the similarity of the first image data signal to the second image data signal is measured at a multiple of a shift value, the first image data signal being shifted by a predetermined shift value prior to the measurement.

92. (Previously presented) In an optical detection system housing a coherent light source for illuminating a surface, and an optical sensing assembly comprising at least one

photosensitive array and at least one optical element, a method for detecting movement comprising:

generating an illumination spot on the surface by lighting the surface with a coherent light beam from the coherent light source, the illumination spot providing optically back-scattered light off the surface;

arranging each optical element to pass an image of the illumination spot onto each photosensor array associated with an optical element, the photosensor array having a plurality of pixels; and

generating at least one image data signal from each photosensor array in response to the image on the plurality of pixels of that photosensor array, each image data signal comprising at least one image data point;

storing a first image data signal and a second image data signal, the second image data signal is substantially a shifted version of the first image data signal; and

measuring similarility of images through the first image data signal and the second image data signal to obtain a displacement value, the displacement value indicative of detected movement, the similarity of the first image data signal to the second image data signal is measured at a multiple of a shift value, the first image data signal being shifted by a predetermined shift value prior to the measurement.

93. (Previously presented) The method of claim 92, wherein the first image data signal is stored in a first portion of a memory unit and the second image data signal is stored in a second portion of the memory unit.

94. (Previously presented) The method of claim 92, wherein the first image data signal is stored in a first portion of a memory unit at a start of operation of the optical detection system and the second image data signal is stored in a second portion of a memory unit for each set of measurements of the similarity of images.

95. (Previously presented) The method of claim 92, wherein the first image data signal comprises a first substantially random image data signal and the second image data signal comprises a second substantially random image data signal.

96. (Previously presented) The method of claim 92, wherein the similarity of the first image data signal to the second image data signal is measured at a multiple of a shift value, the second image data signal being shifted by a predetermined shift value prior to the measurement.

97. (Previously presented) The method of claim 92, wherein the similarity of the first image data signal to the second image data signal is measured at a predetermined multiple of a shift value, the second image data signal being shifted by a predetermined shift value prior to the measurement.

98. (Previously presented) The method of claim 92, wherein the similarity of at least two image data signals is based on each image data comprising a set and is measured at a multiple of a shift value, each set comprising a high resolution and a low resolution image data signal, and the image data signal in a first set being shifted by a predetermined shift value prior to the measurement.

99. (Previously presented) The method of claim 92, wherein measuring the similarity is performed through an application of a cross correlation function.

100. (Previously presented) The method of claim 92, wherein the displacement value comprises identifying a shift to apply to the first image data signal that results in a substantial similarity between the first image shifted by the displacement value and the second image.

101. (Previously presented) The method of claim 92, wherein the first image data signal is replaced by the second image data when a displacement value comprises a predetermined value.

102. (Previously presented) The method of claim 92, wherein the at least one optical element comprises a lens.

103. (Previously presented) The method of claim 92, wherein the at least one optical element comprises a lens and an aperture.

104. (Previously presented) The method of claim 92, wherein the coherent light beam from the coherent light source comprises a collimated beam.

105. (Previously presented) The method of claim 104, wherein the collimated beam produces the illumination spot on the surface.

106. (Previously presented) The method of claim 92, wherein the light source comprises a laser diode.

107. (Previously presented) The method of claim 92, wherein the back-scattered light from the surface, passes through the at least one optical element to generate an image of the illumination spot on the pixels of the at least one photosensor array.

108. (Previously presented) The method of claim 109, wherein the image is focused on the photosensor array.

109. (Previously presented) The method of claim 92, wherein the back-scattered light from the surface, passes through the at least one optical element to generate an image of the illumination spot that is less than or equal to a size of the photosensor array.

110. (Previously presented) The method of claim 92, wherein the first image data signal comprises a first speckle image data signal and the second image data signal comprises a second speckle image data signal.

111. (Previously presented) The method of claim 110, wherein the speckle image associated with at least one of the first speckle image data signal and the second speckle image data signal comprises speckles of a dimension greater than or equal to a pixel dimension.

112. (Previously presented) The method of claim 99, wherein performing the cross correlation function further comprises:
multiplying the first image data signal and the second image data signal and summing results of each multiplication operation over each data point.

113. (Previously presented) The method of claim 112, wherein the cross correlation of the first image data signal to the second image data signal is measured at a multiplicity of a shift value, the first image data signal being shifted by a predetermined shift value before the cross correlation is measured.

114. (Previously presented) The method of claim 113, wherein the displacement value comprises identifying the shift to apply to the first image data signal that results in a substantial cross correlation between the first image shifted by the displacement value and the second image.

115. (Previously presented) In an optical detection system housing a coherent light source for illuminating a surface, and an optical sensing assembly comprising at least one photosensitive array and at least one optical element, a method for detecting movement comprising:

generating an illumination spot on the surface by lighting the surface with a coherent light beam from the coherent light source, the illumination spot providing optically back-scattered light off the surface;

arranging each optical element to pass an image of the illumination spot onto each photosensor array associated with an optical element, the photosensor array having a plurality of pixels; and

generating at least one image data signal from each photosensor array in response to the image on the plurality of pixels of that photosensor array, each image data signal comprising at least one image data point;

storing a first image data signal and a second image data signal, the first image data signal comprises a first speckle image data signal and the second image data signal comprises a second speckle image data signal; and

measuring similarility of images through the first image data signal and the second image data signal to obtain a displacement value, the displacement value indicative of detected movement, the similarity of the first image data signal

to the second image data signal measured at a multiple of a shift value, the first image data signal being shifted by a predetermined shift value prior to the measurement.

116. (Previously presented) The method of claim, 115, wherein the first speckle image data signal is stored in a first portion of a memory unit and the second speckle image data signal is stored in a second portion of the memory unit.

117. (Previously presented) The method of claim 115, wherein the first speckle image data signal is stored in a first portion of a memory unit at a start of operation of the optical detection system and the second speckle image data signal is stored in a second portion of a memory unit for each set of measurements of the similarity of images.

118. (Previously presented). The method of claim 115, wherein the first speckle image data signal comprises a first substantially random image data signal and the second speckle image data signal comprises a second substantially random image data signal.

119. (Previously presented) The method of claim 115, wherein the similarity of the first speckle image data signal to the second speckle image data signal is measured at a multiple of a shift value, the first speckle image data signal being shifted by a predetermined shift value prior to the measurement.

120. (Previously presented) The method of claim 119, wherein the similarity of the first speckle image data signal to the second speckle image data signal is measured at a

predetermined multiple of a shift value, the first speckle image data signal being shifted by a predetermined shift value prior to the measurement.

121. (Previously presented) The method of claim 115, wherein the similarity of at least two speckle image data signals is measured at a multiple of a shift value, each set comprising a high resolution and a low resolution image data signal, and the speckle image data signal in the first set being shifted by a predetermined shift value prior to the measurement.

122. (Previously presented) The method of claim 115, wherein measuring the similarity is performed through an application of a cross correlation function.

123. (Previously presented) The method of claim 115, wherein the displacement value comprises identifying a shift to apply to the first speckle image data signal that results in a substantial similarity between the first speckle image shifted by the displacement value and the second speckle image.

124. (Previously presented) The method of claim 115, wherein the first speckle image data signal is replaced by the second speckle image data when a displacement value comprises a predetermined value.

125. (Previously presented) The method of claim 115, wherein the at least one optical element comprises a lens.

126. (Previously presented) The method of claim 115, wherein the at least one optical element comprises a lens and an aperture.

127. (Previously presented) The method of claim 115, wherein the coherent light beam from the coherent light source comprises a collimated beam.

128. (Previously presented) The method of claim 127, wherein the collimated beam produces the illumination spot on the surface.

129. (Previously presented) The method of claim 115, wherein the light source comprises a laser diode.

130. (Previously presented) The method of claim 115, wherein the back-scattered light from the surface, passes through the at least one optical element to generate an image of the illumination spot on the pixels of the at least one photosensor array.

131. (Previously presented) The method of claim 130, wherein the image is focused on the photosensor array.

132. (Previously presented) The method of claim 115, wherein the back-scattered light from the surface, passes through the at least one optical element to generate an image of the illumination spot that is less than or equal to a size of the photosensor array.

133. (Previously presented) The method of claim 115, wherein a speckle image associated with at least one of the first speckle image data signal and the second speckle image data signal comprises speckles of a dimension greater than or equal to a pixel dimension.

134. (Previously presented) The method of claim 122, wherein performing the cross correlation function further comprises:

multiplying the first image data signal and the second image data signal and

summing results of each multiplication operation over each data point.

135. (Previously presented) The method of claim 134, wherein the cross correlation of the first speckle image data signal to the second speckle image data signal is measured at a multiplicity of a shift value, the first speckle image data signal being shifted by a predetermined shift value before the cross correlation is measured.

136. (Previously presented) The method of claim 135, wherein the displacement value comprises identifying the shift to apply to the first image data signal that results in a substantial cross correlation between the first speckle image shifted by the displacement value and the second speckle image.

137. (Previously presented) The method of claim 136, wherein the second speckle image data signal is substantially a shifted version of the first speckle image data signal.

138. (Previously presented) In an optical detection system housing a coherent light source for illuminating a surface, and an optical sensing assembly comprising at least one photosensitive array and at least one optical element, a method for detecting movement comprising:

generating an illumination spot on the surface by lighting the surface with a coherent light beam from the coherent light source, the illumination spot providing optically back-scattered light off the surface;

arranging each optical element to pass an image of the illumination spot onto each photosensor array associated with an optical element, the photosensor array having a plurality of pixels; and

generating at least one image data signal from each photosensor array in response to the image on the plurality of pixels of that photosensor array, each image data signal comprising at least one image data point;

storing a first image data signal in a first set and storing a second image data signal in a second set, each set comprising a high resolution and a low resolution image data signal, each image data signal representing a random image; and

measuring similarility of image data signals in the first set and the second set to obtain a displacement value, the displacement value indicative of detected movement, the similarity of at least two image data signals is measured at a multiple of a shift value, the image data signal in the first set being shifted by a predetermined shift value prior to the measurement.

139. (Previously presented) The method of claim 138, wherein the first image data signal is stored in a first portion of a memory unit and the second image data signal is stored in a second portion of the memory unit.

140. (Previously presented) The method of claim 138, wherein the first image data signal is stored in a first portion of a memory unit at a start of operation of the optical detection system and the second image data signal is stored in a second portion of a memory unit for each set of measurements of the similarity of images.

141. (Previously presented) The method of claim 115, wherein the second image data signal is substantially a shifted version of the first image data signal.

142. (Previously presented) The method of claim 115, wherein the first image data signal comprises a first speckle image data signal and the second image data signal comprises a second speckle image data signal.

143. (Previously presented) The method of claim 115, wherein the similarity of the first image data signal to the second image data signal is measured at a multiple of a shift value, the first image data signal being shifted by a predetermined shift value prior to the measurement.

144. (Previously presented) The method of claim 115, wherein the similarity of the first image data signal to the second image data signal is measured at a predetermined multiple of a shift value, the second image data signal being shifted by a shift value prior to the measurement.

145. (Previously presented) The method of claim 115 wherein the similarity of the first image data signal to the second image data signal is measured at a multiple of a shift value, the second image data signal being shifted by a predetermined shift value prior to the measurement.

146. (Previously presented) The method of claim 138 wherein measuring the similarity is performed through an application of a cross correlation function.

147. (Previously presented) The method of claim 138 wherein the displacement value comprises identifying a shift to apply to the first image data signal that results in a substantial similarity between the first image shifted by the displacement value and the second image.

148. (Previously presented) The method of claim 138 wherein the first image data signal is replaced by the second image data when a displacement value comprises a predetermined value.

149. (Previously presented) The method of claim 138 wherein the at least one optical element comprises a lens.

150. (Previously presented) The method of claim 138, wherein the at least one optical element comprises a lens and an aperture.

151. (Previously presented) The method of claim 138, wherein the coherent light beam from the coherent light source comprises a collimated beam.

152. (Previously presented) The method of claim 151, wherein the collimated beam produces the illumination spot on the surface.

153. (Previously presented) The method of claim 138, wherein the light source comprises a laser diode.

154. (Previously presented) The method of claim 138, wherein the back-scattered light from the surface, passes through the at least one optical element to generate an image of the illumination spot on the pixels of the at least one photosensor array.

155. (Previously presented) The method of claim 154, wherein the image is focused on the photosensor array.

156. (Previously presented) The method of claim 138, wherein the back-scattered light from the surface, passes through the at least one optical element to generate an image of the illumination spot that is less than or equal to a size of the photosensor array.

157. (Previously presented) The method of claim 142, wherein the speckle image associated with at least one of the first speckle image data signal and the second speckle image data signal comprises speckles of a dimension greater than or equal to a pixel dimension.

158. (Previously presented) The method of claim 146, wherein performing the cross correlation function further comprises:
multiplying the first image data signal and the second image data signal and summing results of each multiplication operation over each data point.

159. (Previously presented) The method of claim 158, wherein the cross correlation of the first image data signal to the second image data signal is measured at a multiplicity of a shift value, the first image data signal being shifted by a predetermined shift value before the cross correlation is measured.

160. (Previously presented) The method of claim 159, wherein the displacement value comprises identifying the shift to apply to the first image data signal that results in a substantial cross correlation between the first image shifted by the displacement value and the second image.

161. (Previously presented) In an optical detection system housing a coherent light source for illuminating a surface, and an optical sensing assembly comprising at least one

photosensitive array and at least one optical element, a method for detecting movement comprising:

generating an illumination spot on the surface by lighting the surface with a coherent light beam from the coherent light source, the illumination spot providing optically back-scattered light off the surface;

arranging each optical element to pass an image of the illumination spot onto each photosensor array associated with an optical element, the photosensor array having a plurality of pixels; and

generating at least one image data signal from each photosensor array in response to the image on the plurality of pixels of that photosensor array, each image data signal comprising at least one image data point;

storing a first image data signal and a second image data signal; and

measuring similarility of images through the first image data signal and the second image data signal to obtain a displacement value, the displacement value indicative of detected movement, the similarity measured through application of a cross correlation function further comprising,

multiplying the first image data signal and the second image data signal, and

summing results of each multiplication operation over each data point.

162. (Previously presented) The method of claim 161, wherein the cross correlation of the first image data signal to the second image data signal is measured at a multiplicity of a shift value, the first image data signal being shifted by a predetermined shift value before the cross correlation is measured.

163. (Previously presented) The method of claim 162, wherein the displacement value comprises identifying the shift to apply to the first image data signal that results in a substantial cross correlation between the first image shifted by the displacement value and the second image.

164. (Previously presented) An optical detection system to identify displacement, the system comprising:

a coherent light source configured to generate an illumination spot on a surface, the illumination spot providing optically back-scattered light off the surface;

at least one photosensitive array, each photosensor array having pixels;

at least one optical element, each optical element associated with a photosensitive array, each optical element configured to pass an image of the illumination spot onto its associated photosensor array to generate at least one image data signal from in response to the image on the pixels of the associated photosensor array, each image data signal comprising at least one image data points;

a first storage area configured to store a first image data signal;

a second storage area configured to store a second image data signal; and

a comparison module configured to measure a similarity of images through the first image data signal and the second image data signal to obtain a displacement value, each image data signal comprising at least one image data points, the comparison module applying a cross-correlation function to a multiple of a shift value on a first randomly patterned image data signal being shifted by a

predetermined shift value from a second randomly patterned image data signal.